3.2 Medical Requirements Overview

TABLE 3.2: MEDICAL REQUIREMENTS OVERVIEW

MEDB# and Title:	MEDB 3.2 Biodosimetry Testing (Occupational Monitoring)
Sponsor:	Medical Operations
IPT:	Radiation
Category:	Medical Requirements
References:	SSP 50260 ISS Medical Operations Requirements Document (MORD) SSP 50667 Medical Evaluations Document (MED) Volume B
Purpose/Objectives:	These results are used in conjunction with in-flight physical dosimetric measurements to characterize crew exposures. In addition, these values are used for validation and development of risk assessment models used to characterize excess risk incurred by crews due to radiation exposure and to predict risk incurred in future flights for the purpose of mission design (EVA planning, etc.)
Measurement Parameters:	Lymphocyte chromosome aberration frequency, whole body radiation dose equivalent.
Deliverables:	Exposure records for occupational health determination, individual specific dose-response curves.
Flight Duration:	Flight of 2 months or more, or if predicted effective dose exceeds 10 rem
Number of Flights:	All
Number and Type of Crew Members Required:	ISS crewmembers. Each Partner agency is responsible for arranging testing for its crewmembers. Back-up crew will only complete preflight MATs greater than L-45 days unless specifically waived by crew surgeon. If crew swap does occur, back-up crew will complete all preflight MATs.
Other Flight Characteristics:	None

3.3 Preflight Training - None

3.4 Preflight Activities

TABLE 3.4: PREFLIGHT ACTIVITIES

<table>
<tr><td>Preflight Activity
Description:</td><td colspan="4">Preflight samples will be collected on the primary and backup crewmember. One 25 ml blood sample is collected preflight to develop an individual-specific baseline control. Only the lymphocytes are required for analysis, thus the remainder of the sample may be shared with other protocols. The timing of the blood draws can be adjusted to coincide with other sample draws. For U.S. crewmembers launching or landing in Russia, a 180-day pre-launch window for preflight samples and 10-14 day postflight window for samples has been allowed. Maximum time between preflight sampling and launch should not exceed 180 days for any crewmember.</td></tr>
<tr><td rowspan="2">Schedule:</td><td>Duration:</td><td>Schedule:</td><td>Flexibility:</td><td>Personnel Required:</td></tr>
<tr><td>Blood Sample Collection – 15 min</td><td>L-45/30 days</td><td>Maximum time between sampling and launch should not exceed 180 days for any crewmember.</td><td>Lab Personnel/ Crewmember</td></tr>
<tr><td rowspan="2">Ground Support Requirements Hardware/Software</td><td colspan="2">Preflight Hardware:</td><td>Preflight Software:</td><td>Test Location:</td></tr>
<tr><td colspan="2">Phlebotomy Hardware (will include sodium-heparinized tubes into which the sample will be drawn)</td><td>N/A</td><td>U.S. (Testing is nominally conducted in the U.S. but may be conducted at an alternate site, if necessary)</td></tr>
<tr><td rowspan="4">Testing Facilities:</td><td>Minimum Room Dimensions:</td><td>Number of Electrical Outlets:</td><td>Temperature Requirements:</td><td>Special Lighting:</td></tr>
<tr><td>8' x 10' (typical exam room)</td><td>None</td><td>Ambient</td><td>N/A</td></tr>
<tr><td>Hot or Cold Running Water:</td><td>Privacy Requirements:</td><td>Vibration/Acoustic Isolation:</td><td>Other:</td></tr>
<tr><td>N/A</td><td>N/A</td><td>N/A</td><td>1 table, 1 chair</td></tr>
<tr><td>Constraints/Special Requirements:</td><td colspan="4">N/A</td></tr>
<tr><td>Launch Delay Requirements:</td><td colspan="4">Data collection will be repeated if sampling done greater than L-180 days.</td></tr>
<tr><td>Notes:</td><td colspan="4">In the event that U.S. crewmembers are unable to return to JSC for sampling, provisions will be made to do the sampling at an alternate site and to transport the sample back to JSC within 72 hrs of blood draw. For the sample to remain viable, it must be kept between 1 and 8 C^o for entire transit period between the alternate site (Russia) and JSC.</td></tr>
<tr><td rowspan="2">Data Delivery:</td><td colspan="4">Data/Report to Designated Recipients (Nominal/Contingency):</td></tr>
<tr><td colspan="4">A data analysis containing crewmembers chromosome exchange values from the preflight blood draw will be delivered to the Radiation Health Officer (RHO) within 3 months of the blood draw. The RHO will then provide a report to the crew surgeon within 2 weeks. Preflight results serve as baseline for the postflight sample.</td></tr>
</table>

3.5 In-Flight Activities – None

3.6 Postflight Activities

TABLE 3.6: POSTFLIGHT ACTIVITIES

<table>
<tr><td rowspan="2">Postflight Activity
Description:</td><td colspan="5">A 15 ml blood sample is collected at R+10 days. Postflight results are compared to preflight control to assess the whole body exposure. Only the lymphocytes are required for analysis, thus the remainder of the sample may be shared with other protocols. The timing of the protocol can be adjusted to coincide with other sample draws. For U.S. crewmembers launching or landing in Russia, a 180-day pre-launch window for preflight samples and 10-14 day postflight window for samples has been allowed.</td></tr>
<tr><td>Schedule:</td><td colspan="2">Duration:</td><td colspan="2">Schedule:</td><td>Flexibility:</td><td>Personnel Required:</td></tr>
<tr><td></td><td colspan="2">Blood Sample Collection – 15 min</td><td colspan="2">R+7/14 days</td><td>N/A</td><td>Lab Personnel/Crewmember</td></tr>
<tr><td rowspan="2">Ground Support Requirements Hardware/Software</td><td colspan="3">Postflight Hardware:</td><td>Postflight Software:</td><td colspan="2">Test Location:</td></tr>
<tr><td colspan="3">Phlebotomy Hardware (will include sodium-heparinized tubes into which the sample will be drawn)</td><td>N/A</td><td colspan="2">U.S. (Testing is nominally conducted in the U.S. but may be conducted at an alternate site, if necessary)</td></tr>
<tr><td rowspan="2">Testing Facilities</td><td>Minimum Room Dimensions:</td><td>Number of Electrical Outlets:</td><td colspan="2">Temperature Requirements:</td><td colspan="2">Special Lighting:</td></tr>
<tr><td>8' x 10' (typical exam room)</td><td>None</td><td colspan="2">Ambient</td><td colspan="2">N/A</td></tr>
<tr><td></td><td>Hot or Cold Running Water:</td><td>Privacy Requirements:</td><td colspan="2">Vibration/Acoustic Isolation:</td><td colspan="2">Other:</td></tr>
<tr><td></td><td>N/A</td><td>N/A</td><td colspan="2">N/A</td><td colspan="2">1 table, 1 chair</td></tr>
<tr><td>Constraints/Special Requirements:</td><td colspan="6">N/A</td></tr>
<tr><td>Early Destow / Early Return:</td><td colspan="6">N/A</td></tr>
<tr><td>Notes:</td><td colspan="6">In the event that U.S. crewmembers are unable to return to JSC for sampling, provisions will be made to do the sampling at an alternate site and to transport the sample back to JSC within 72 hrs. of blood draw. For the sample to remain viable, it must be kept between 1 and 8C° for entire transit period between the alternate site (Russia) and JSC.</td></tr>
<tr><td rowspan="2">Data Delivery</td><td colspan="3">Data/Report to Designated Recipients:</td><td colspan="3">Mission Summary Report:</td></tr>
<tr><td colspan="3">A comparison of the analytical results of the pre & postflight samples will be delivered to the RHO at approx. R+3 mo. The RHO will then provide a report to the crew surgeon within 2 weeks.</td><td colspan="3">The RHO will submit a mission report containing mission and accumulated mortality and cancer induction risks to the crew surgeon and Medical Operations for archiving within 2 weeks.</td></tr>
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3.7 Summary Schedule

TABLE 3.7: SUMMARY SCHEDULE

ACTIVITY	DURATION	SCHEDULE	FLEXIBILITY	BLOOD VOLUME	PERSONNEL REQUIRED	CONSTRAINTS
Preflight Training - None						
Preflight						
Blood Sample Collection	15 minutes	L-45/30 days	Maximum time between pre-flight sampling and launch should not exceed 180 days for any crewmember.	25 ml	Lab Personnel/ Crewmember	The timing of the protocol can be adjusted to coincide with other sample draws. Each Partner agency is responsible for arranging biodosimetry testing for its crewmembers.
In-Flight - None						
Wheels-Stop - None						
Postflight						
Blood Sample Collection	15 minutes	R+7/14 days	N/A	15 ml	Lab Personnel/ Crewmember	The timing of the protocol can be adjusted to coincide with other sample draws. Each Partner agency is responsible for arranging biodosimetry testing for its crewmembers.
Postflight Debrief - None						